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BACK INJURY PREVENTION WORKSHOP

A PROJECT FUNDED BY THE
OCCUPATIONAL HEALTH AND SAFETY
HERITAGE GRANT PROGRAM

[redacted]

BACK INJURY PREVENTION

WORKSHOP

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REPORT TO
ALBERTA OCCUPATIONAL HEALTH AND SAFETY HERITAGE GRANT PROGRAM

ON THE

BACK INJURY PREVENTION WORKSHOP

AT THE

THIRD ANNUAL INJURY IN ALBERTA CONFERENCE - INJURY PREVENTION: MAKING IT HAPPEN

OCTOBER 16 & 17, 1991

Background - The Planning Committee of the Third Annual Injury in Alberta Conference determined that back injuries represented a major prevention opportunity in the occupational health and safety area and therefore chose to include a Back Injury Prevention Workshop among the practical hands-on workshop for the Conference.

Goal To increase the knowledge of workshop participants in the extent of the back injury prevention challenge in Alberta; the components of an ideal back injury prevention program; and the experiences of selected Alberta workplaces in overcoming barriers to implementing back injury prevention programs.

Objectives

1. Increase the number of Alberta workplaces that have at least one employee that know the elements of an ideal back injury prevention program, the extent of the problem and the barriers to implementing such programs.

2. Increase the number of Alberta workplaces that have at least one employee that has drafted a plan to implement a back injury prevention program.

Attendees - Thirty-six people participated in this workshop. They were from the following backgrounds: Occupational health and safety professionals, worker representatives, management representatives from workplaces throughout Alberta, public health nurses, health professionals, government officials, and management consultants.

Description of the Workshop: The Third Annual Injury in Alberta Conference theme was "Injury Prevention: Making It Happen". Back injuries arising in Alberta workplaces produce an unacceptable burden of disability and loss to the individual workers and their families as well as the society and economy as a whole. We know that "injuries are predictable and preventable". In combination with the plenary sessions planned for the Conference, the Back Injury Prevention Workshop participants gained valuable skills to use in their workplaces to mobilize their organizations to injury prevention generally and back injury prevention specifically. In the three sessions which made up this Workshop, participants gleaned the following information and experiences:

Session 1: **'What do we know about this Injury?'** or the epidemiology of back injuries. Presenter, Dr. Connie Robertshaw of the Workers' Compensation Board, provided an excellent overview of Alberta's back injury profile in 1990. See Attachment 1 for a copy of Dr. Robertshaw's overhead transparencies. A second presentation during this session dealt with **'What's being done about this Injury?'** Mr. Rob McArthur of the Workers' Compensation Board presented an overview of the changes at WCB over the past two years and the resulting case management pro-active approach to rehabilitation.

Workshop Component - Participants were split in five work groups and asked to determine how they would identify the back injury problems in their workplaces in as much detail as possible. Secondly each group was requested to identify sources for obtaining these data. Each group reported back and participants noted that they learned how important it was to clearly understand the back injuries in their organizations. See attachment 2 for a copy of the work groups deliberations.

Session 2: **Information Component - 'What would an ideal back injury prevention program look like?'** or a model back injury prevention program. Ms. Pirjo Nyran, with the Health Care Occupational Health and Safety Services of the Ontario Hospital Association presented the Components of Musculoskeletal Injury Prevention Program and lead participants in a workshop to assess their organization's current level of back injury prevention program using a matrix system. See attachments 3 and 4 for copies of Ms. Nyran's presentation and workshop handouts. In addition, Ms. Nyran distributed copies of two journal articles on recent evaluations of this comprehensive approach to musculoskeletal injury prevention as well as a bibliography for ergonomics. See attachments 5, 6 and 7 for copies of these materials.

Ms. Lisa Johnson and Mr. Robert Gilchrist of Alberta Occupational Health and Safety supplemented Ms. Nyran's presentation by providing a more indepth overview of ergonomics.

Session 3: **Information Component - 'How to get there from here'?** Three organizations within Alberta with back injury prevention programs at various levels of development presented their experiences in a case study format. Ms. Daryl Palmer of the Misericordia Hospital presented an overview of the back injury prevention program being introduced at that hospital. Two representatives of the Nova Corporation presented components of Nova's injury prevention initiatives. Ms. Janice Krushinsy, Occupational Health Nurse, discussed the pre-employment assessment, including back fitness, conducted by Nova's occupational health services to provide a baseline of a workers ability to function safely in their demanding work environment.

Mr. Everd Hare, Health and Safety Specialist, also of Nova Corporation discussed their experience in developing community partnerships through the 'Adopt a School' program in Fairview, Alberta. Mr. Hare noted that these partnerships have been mutually beneficial for both the students and the workers of Nova. He forecast that these programs had great potential to enstill safety habits including back safety, in young workers that could last a lifetime.

Workshop Component - In small work groups, participants were requested to develop a plan for their workplace on what actions they would take in the next six to twelve months to move their organizations towards an improved back injury prevention program. See attachment 8 for a summary of the work groups' deliberations resulting in action plans.

Evaluations: Fifty-five point seven percent of workshop participants evaluated the workshop as Excellent or Very Good and another 38.9 rated it as Good. Comments included that the small work groups were very helpful in allowing participants to develop some useful action plans for their workplaces. Some criticism of overlap and belabouring of points by some speakers. Otherwise participants reported that they had achieved their objectives.

December 6, 1991

Attachment 1

INDUSTRIAL BACK INJURIES

IN ALBERTA

THE PROBLEM

- MANY BACK INJURIES
- HIGH COSTS:
  - PAIN AND SUFFERING
  - FINANCIAL
- LOST TIME

INDUSTRIAL BACK INJURY
A DEFINITION:

- OCCURRED IN THE COURSE OF EMPLOYMENT
- EMPLOYER INSURED BY WCB
- ENTITLED UNDER THE WCB ACT

ALBERTA'S WORKFORCE

IN 1990

POPULATION - 2,472,000

TOTAL WORKFORCE: 54% OF THE POPULATION

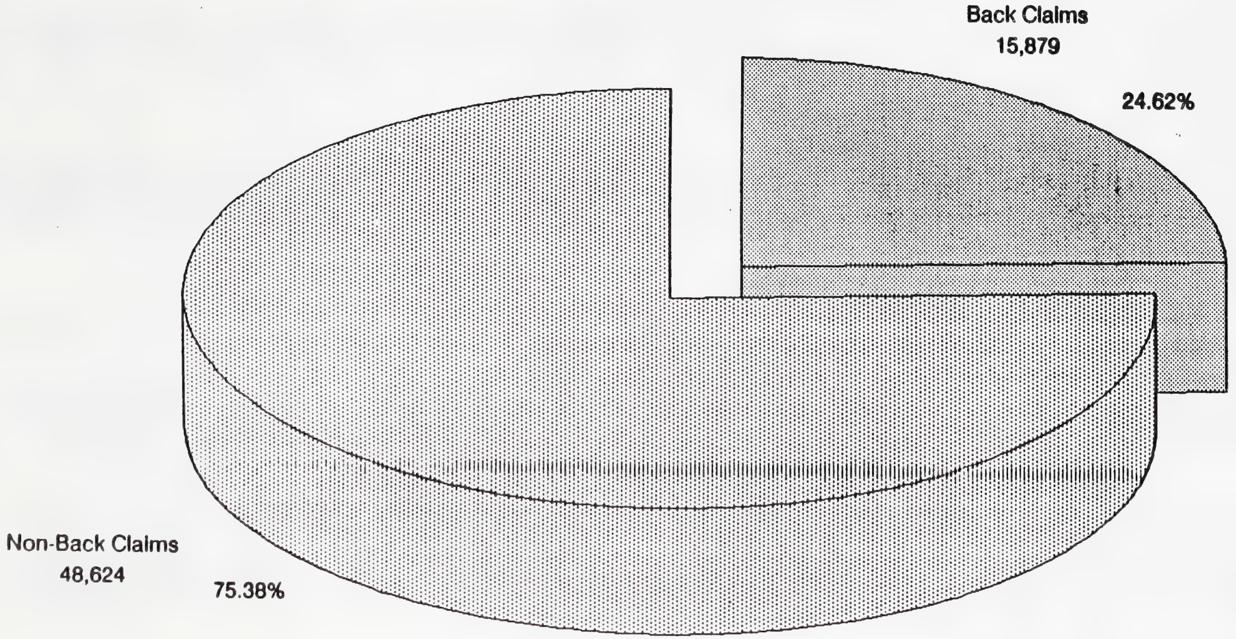
WORKERS INJURED: 5% OF THE WORKFORCE

BACK INJURIES: 1.2% OF THE WORKFORCE

IN ALBERTA
IN 1990

- 15,879 NEW BACK CLAIMS
- 25% OF INDUSTRIAL INJURIES
- 35% OF LOST-TIME INJURIES

Newly Reported Back Claims as a Percentage of the Total 1990



Total Newly Reported Claims in 1990 - 64,503.

BACK INJURED WORKERS SERVED BY WCB IN 1990

- **NEW CLAIMS: 15,879**
- **RE-OPENED CLAIMS: 970**
- **CARRIED OVER FROM 1989: APPROX. 5,000**

TOTAL: 21,849

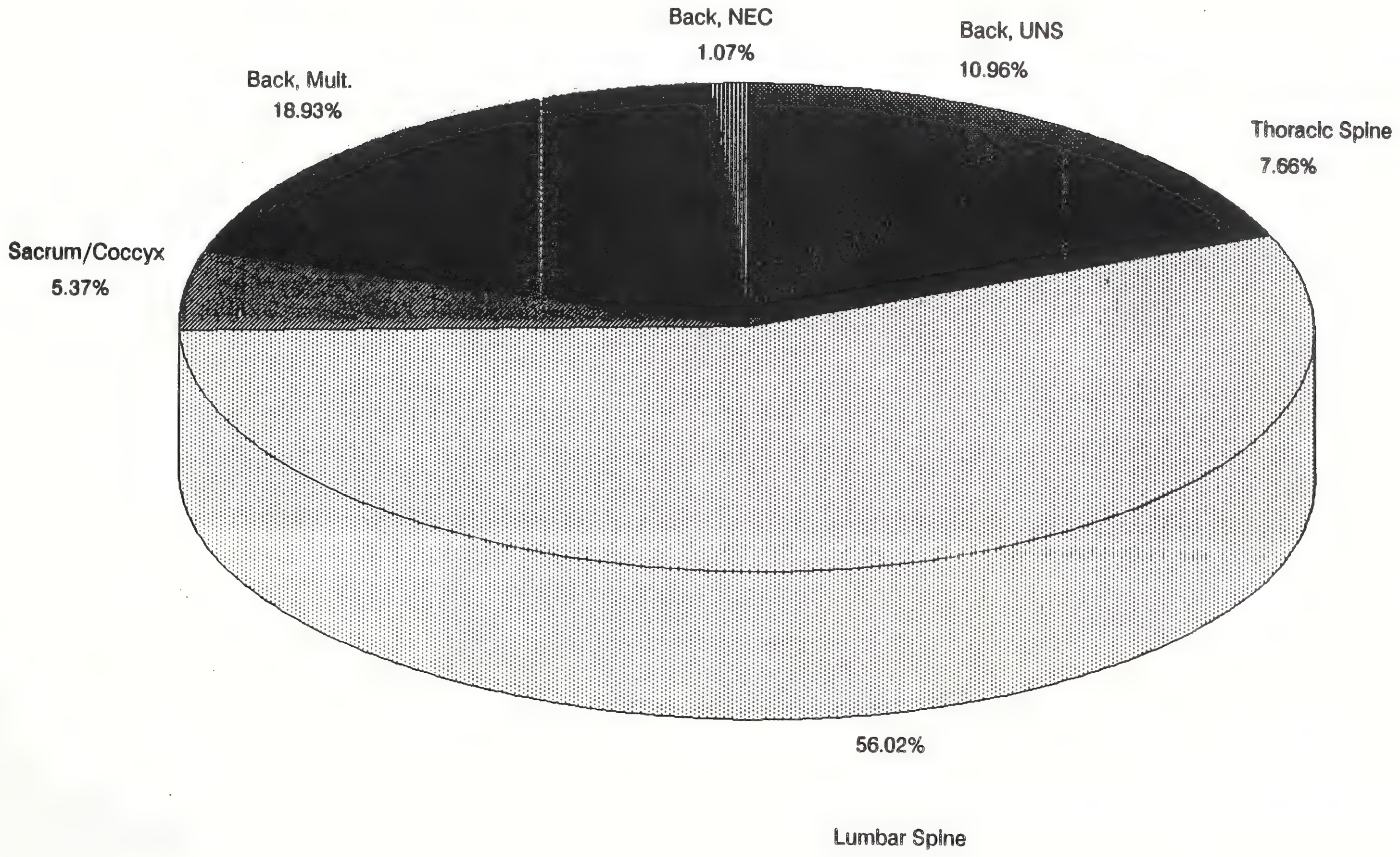
THE BACK INJURED WORKER
(1990)

AVERAGE AGE: 35

SEX: M:F = 3:1

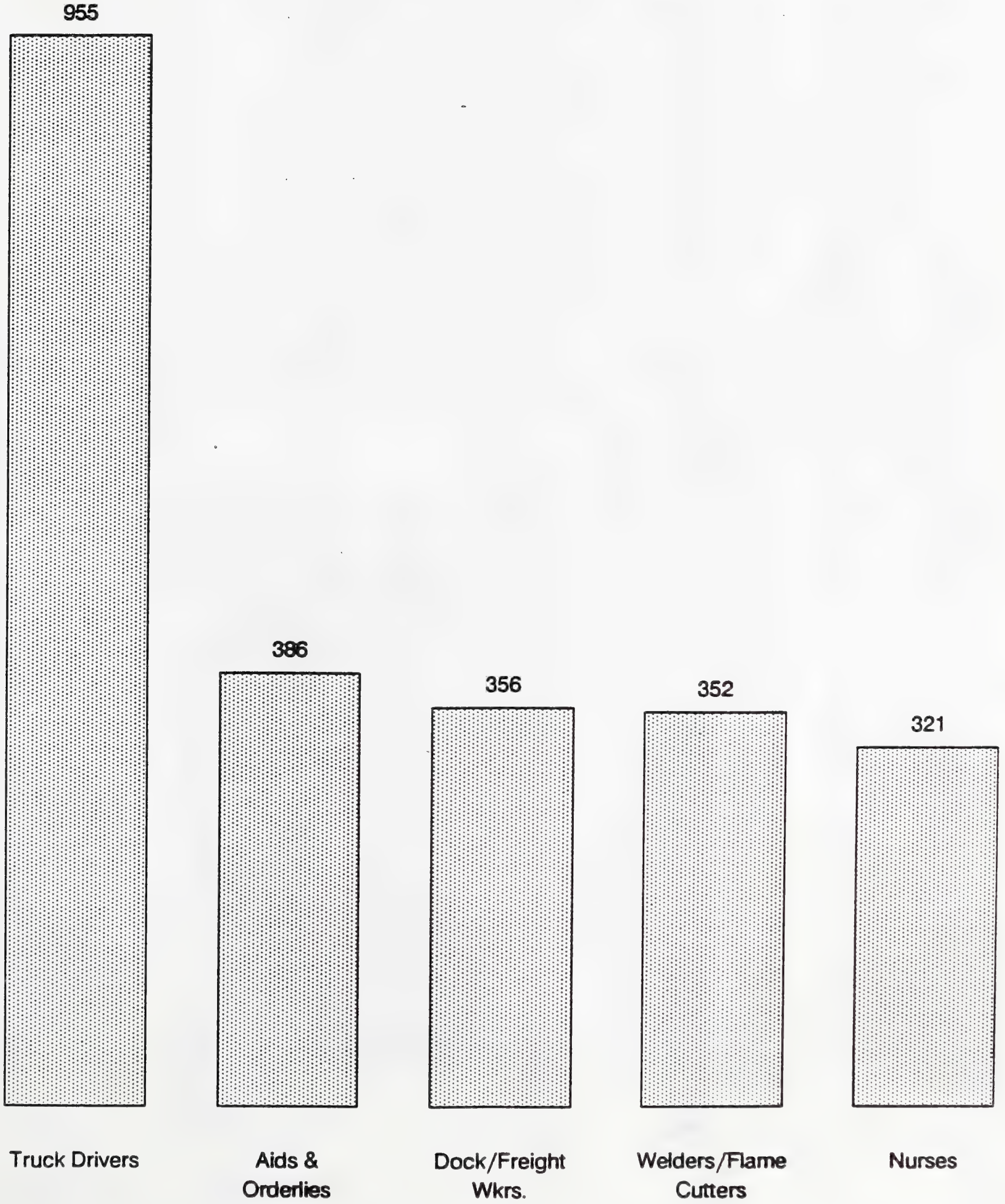
AVERAGE COMPENSATION DAYS: 19

Newly Reported Back Claims
1990

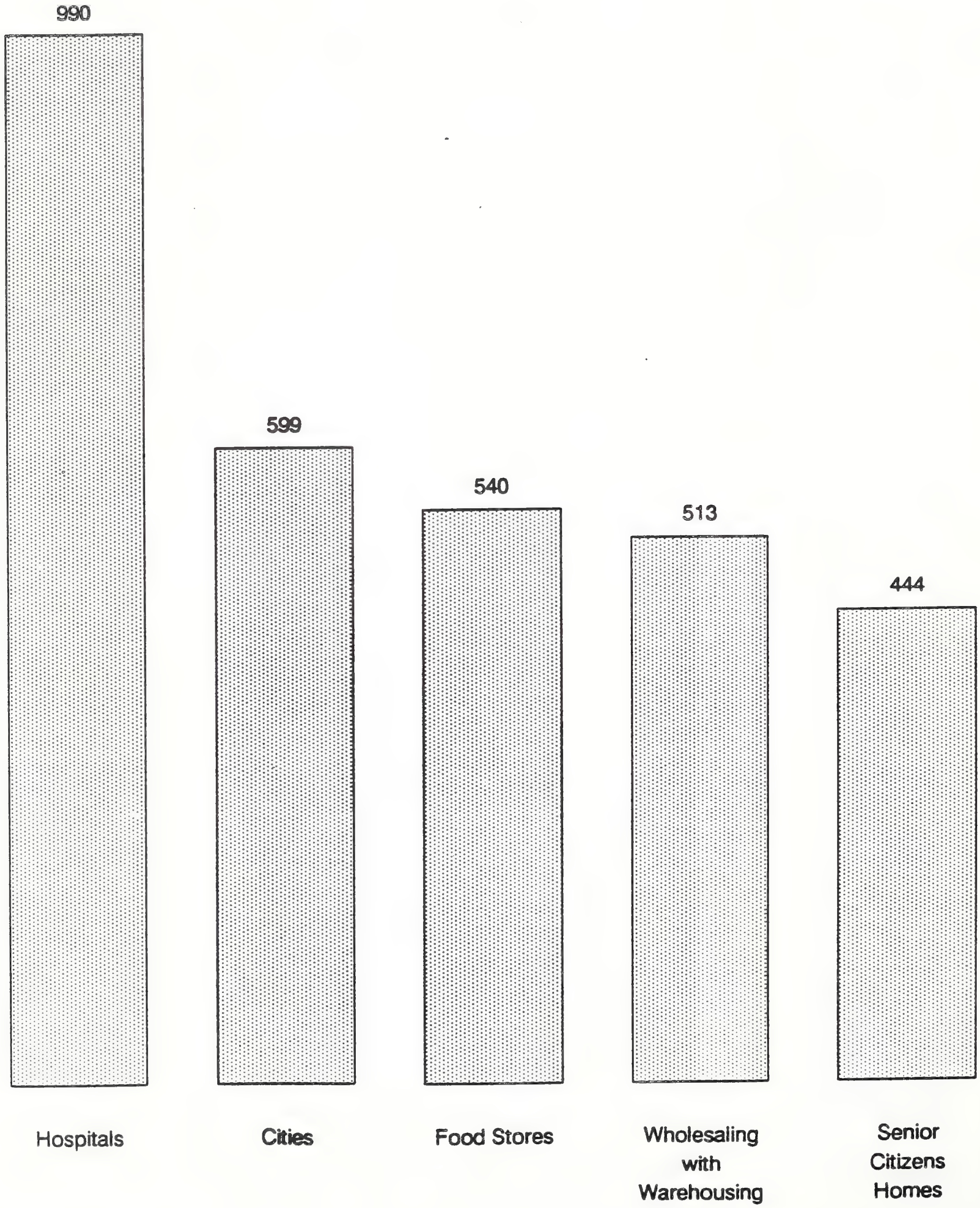


Total Newly Reported Back Claims = 15,879.

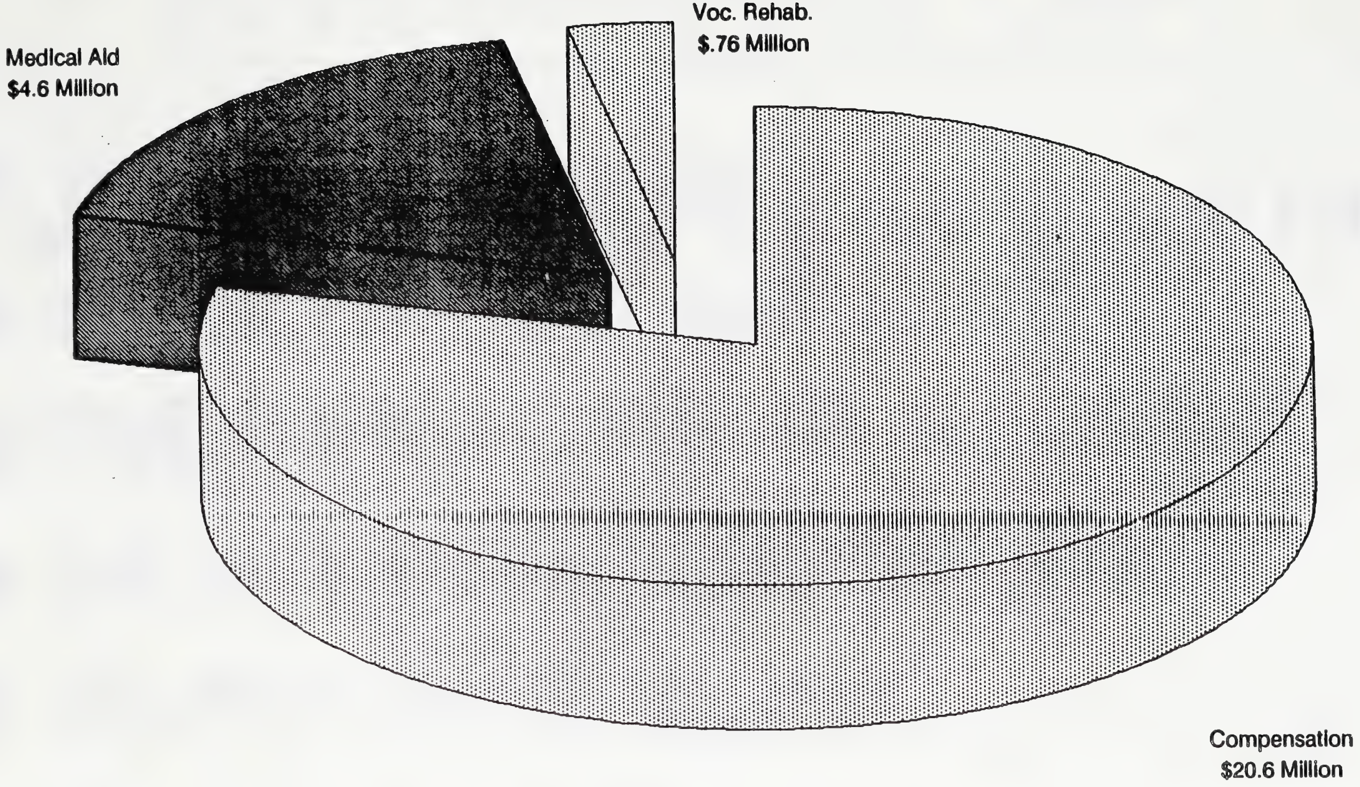
Top 5 Occupations Sustaining Back Injuries Reported Year 1990



Top 5 Industries
Sustaining Back Injuries
Reported Year 1990



Breakdown of Costs
Newly Reported Back Claims
1990



1990 Pension Costs = $25,258.19. Total Costs are approximately $26 Million.

EVERYONE IS AT RISK

70 - 80% OF PEOPLE EXPERIENCE LBP

HIGH INCIDENCE OF OCCUPATIONAL LBP

- HEAVY LIFTING
- PROLONGED BENDING
- TWISTING
- HEAVY PHYSICAL WORK
- REPETITIVE WORK
- Static Work Postures

EMPLOYER LOSS CONTROL STRATEGIES

(DONALD ASKEY, 1988)

1. INCLUDE INJURY MANAGEMENT IN YOUR SAFETY PROGRAM
2. KEEP ACCOUNTABILITY FOR INJURY MANAGEMENT AT THE WORKSITE
3. REQUIRE INJURY DATA TO BE PART OF YOUR MANAGEMENT REPORTING
4. SET INJURY MANAGEMENT OBJECTIVES
5. STRESS AN EARLY RETURN TO WORK

EMPLOYER LOSS CONTROL STRATEGIES

CONTINUED

6. CONCENTRATE ON MANAGING TODAY'S INJURIES
7. WORK WITH WCB CASE MANAGERS
8. TRY NOT TO BLAME THE SYSTEMS
9. MAKE A POSITIVE COMMITMENT FOR THE LONG TERM

WORK FOR ALL
FOR THOSE WITH LOW BACK PAIN
AS WELL

ALF NACHEMSON, 1983

Attachment 2

BACK INJURY WORKSHOP: OCTOBER 16/17 - 1991

SETTING UP A BACK INJURY PREVENTION PROGRAM

1. IDENTIFY INFORMATION REQUIRED BEFORE ATTEMPTING TO PLAN A BACK INJURY PREVENTION PROGRAM

A. BACK INJURY ANALYSIS

i) What is the degree of the problem?
ii) What group of individuals are sustaining the injury?
iii) Where are the injuries occurring?
iv) Severity of the injuries e.g. # lost time days/claim?
v) Type of injury e.g. strains/sprains, trauma?
vi) What area of the back is being injured?
vii) What tasks were involved and how are these tasks being done?
viii) Are the injuries new or recurring?
ix) Other contributing factors -stress, time of day, age of workforce, turnover rate, change in process, attitude, workload, stress.

B. NUTRITIONAL STATUS OF WORKERS

C. FITNESS LEVEL OF WORKERS

D. HOW CAN THESE INJURIES BE PREVENTED

E. WHAT TYPE OF EDUCATIONAL/ORIENTATION SESSION IS ALREADY IN PLACE

F. IS THERE ANYONE ACCOUNTABLE FOR OH&S PERFORMANCE

G. COST TO EMPLOYER OF INJURIES

H. MODIFIED WORK OPPORTUNITIES FOR INJURED EMPLOYEE

2. WHAT ARE THE SOURCES TO OBTAIN THE INFORMATION REQUIRED

A. EXAMINE BACK INJURY STATISTICS FROM A SIMILAR INDUSTRY TO SEE HOW WE COMPARE

B. DO A LITERATURE SEARCH ON TOPIC

C. HUMAN RESOURCES

D. INCIDENT REPORTS/WCB STATISTICS

E. INTERVIEW INJURED EMPLOYEES/MANAGERS

F. DETERMINE EMPLOYEE PERCEPTION OF SAFE WORK PRACTICES/POLICIES PER QUESTIONNAIRE

G. JOB ANALYSIS OF HIGH RISK GROUP

H. SURVEY PRESENT EMPLOYEES TO DETERMINE EMPLOYEE'S JOB KNOWLEDGE AND PERCEPTION OF SAME

I. LOOK AT JOB DESCRIPTIONS, MISSION STATEMENTS

J. EVALUATE PERFORMANCE APPRAISAL PROCESS TO SEE IF THEY ADDRESS OH&S AT ALL LEVELS

K. ASSESS ANY EXISTING PROGRAMS RE: CURRENT/ACCURATE INFORMATION

L. INVESTIGATE EXISTING BACK CARE PROGRAMS IN PARALLEL INDUSTRY

M. INVESTIGATE EXISTING BACK CARE PROGRAMS IN COMMUNITY

N. DO ERGONOMIC ASSESSMENT

O. DO BACK FITNESS APPRAISAL

P. DO ASSESSMENT OF INJURED EMPLOYEE e.g. stress, nutrition, and other lifestyle issues

Components of Musculoskeletal Injury Prevention Program

- Preplacement Assessment
- Orientation
- Training/Education
- Fitness/Pause Gymnastics
- Stress Management
- Preventive Maintenance of Equipment
- Modified Work
- Task Analysis
- Job Design
- Workplace Design

HCOHSA 1991

Every Component of MIP Program Has to Have:

- Policies and Procedures
- Clear Roles and Responsibilities
- Follow-up and Evaluation

Preplacement Assessment

What?

- Health Review
- Tests/Interviews
- Fitness
- Human Rights

Who?

- OHN
- Physician
- Physiotherapist/Occupational Therapist
- Human Resources

Orientation

What?

- General
- Job Specific
- Buddy System
- Support System
- Evaluation

Who?

- Human Resources
- Staff Educator
- OHN
- Supervisor
- Peers

HCOHSA 1991

Training/Education

A. Training-The-Trainers (Core-Group)

What?

- Anatomy & Physiology of the Spine
- Body Mechanics/Safe Procedures
- Assessment of Risk Factors Involved
- Problem Identification & Solving
- Proper Use of Equipment
- Principles of Adult Education

Who?

- Any Staff Member
  - Volunteered
  - Selected By Co-worker
- Staff Educator
- External Resources

B. On-going Staff Training by Core-Group

Fitness/Pause Gymnastics

What?

    - General Fitness
    - Specific (Back, Neck, etc.)
    - Pause Gymnastics

- Volunteer
- Timing
- Fees

Who?

    - Anyone Interested
    - External/Internal Resources (Fitness Instructor, Physiotherapist, etc.)

Preventive Maintenance of Equipment

What?

- All Equipment in use

Who?

- Maintenance
- Engineering

Stress Management

What?

- Relaxation
- Joga
- Counselling

Who?

- Internal/External Resources
- Volunteer Basis

Modified Work

What?

- Temporary
- Permanent
- Alternative
- Identification of Jobs/Tasks
- Length
- Time of Day/Week/Shift
- Buddy System
- Time vs Tasks

Who?

- OHN
- Physician
- Physiotherapist/Occupational Therapist
- Supervisor
- Peers

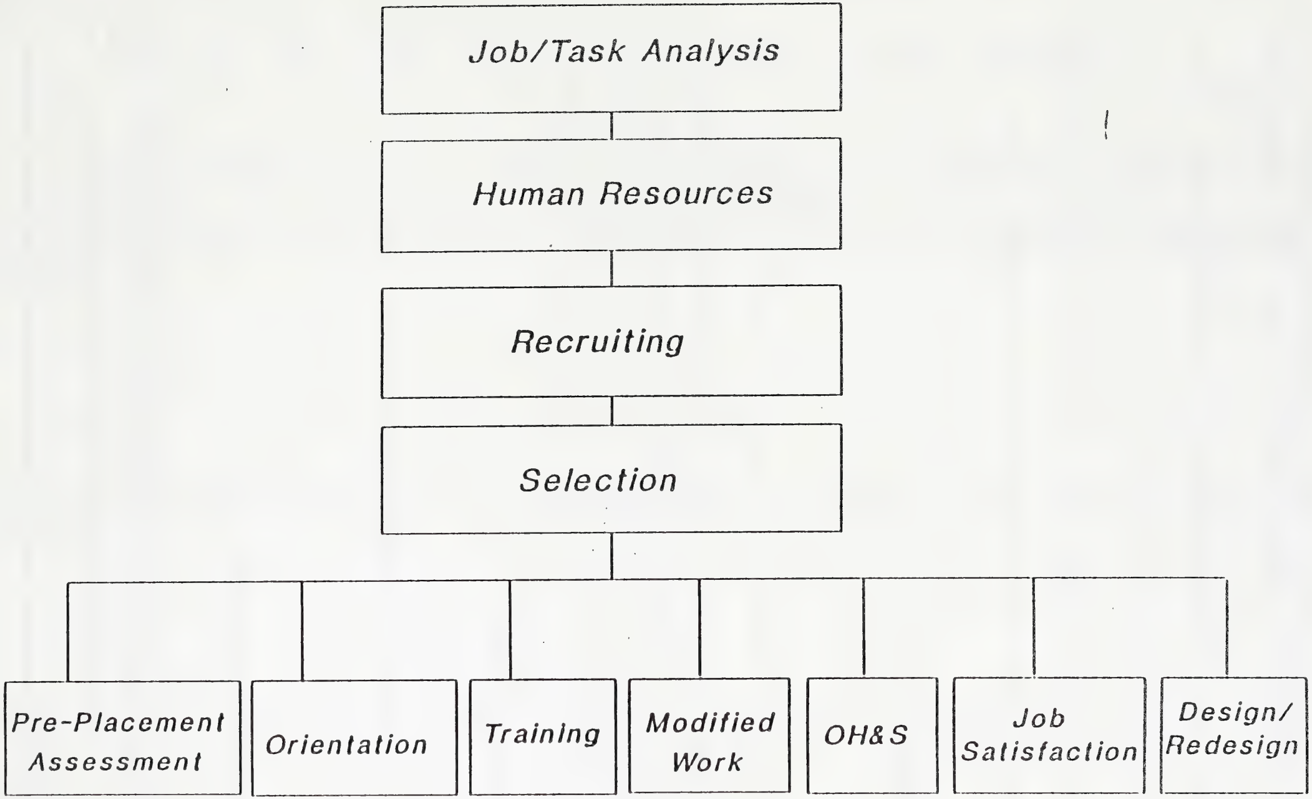
Task Analysis/Ergonomics

What?

- Methods
- Tools
- Problem Identification/Solving
- Job Break Down
- Assessment of Physical/Psychological Demands
- Assessment of Worksite, Equipment, Environment, conditions

Who?

- Ergonomist
- Physiotherapist/Occupational Therapist With Expertise


Job/Task Analysis
Human Resources
Recruiting
Selection
Pre-Placement Assessment
Orientation
Training
Modified Work
OH&S
Job Satisfaction
Design/ Redesign

HCOHSA 1991

What types of back injury prevention related programs do you have in place in your organization?

- ____
- ____
- ____
- ____

Who is involved and how?

____

____

____

____

In your opinion how effective are they?

Good ☐
Fair ☐
Poor ☐

Why do you think they are good/fair/poor?

____

____

____

____

Ideas for Improving Musculoskeletal Injury Control Programs

	Person	Task	Environment & Worksite	Organization/Management
Before Work				
During Work				
After Work Stops Due to Injury				

HCOHSA 1991

Matrix of Ideas for Improving Back Injury Control Programs for Nursing Staff.

	Person	**Task**	**Environment**
Before Work	Evaluating new nursing staff. Training new staff in body mechanics and back care. Training new staff in techniques for patient-handling in general, and for ward-specific tasks based in needs assessment.	Identifying most back-stressing tasks. Changing the most back-stressing tasks by eliminating or modifying task demands. Providing appropriate patient transfer devices, and training staff in proper and appropriate usage.	Identifying and eliminating bumps in floor surfaces, stair hazards, and constraints that compromise patient-handling technique. Appointing someone to represent nursing on key committees, e.g., equipment safety.
During Work	Providing feedback on patient-handling technique as part of on-the-job training. Providing refresher training specific to needs. Encouraging staff physical fitness.	Providing feedback on use of patient-handling devices. Providing adequate staff. Organizing group problem solving. Designating patient-handling device coordinator.	Encouraging prompt clean-up of spilled fluids, and clearing of parking lot ice. Getting management [commitment] to the programs, and maintaining their support.
After Work Stops Due to Back Injury	Providing prompt treatment and personalized rehabilitation program. Establishing a return-to-work program.	Asking after each back injury if the task could be modified to reduce risk in the future.	Asking after each back injury if the environment could be changed to reduce risk in the future.

From *Essentials of Modern Hospital Safety,* by William Charney and Joseph Schirmer, Copyright 1990, Lewis Publishers, Inc., Chelsea, MI. Used with permission.

Trends in Ergonomics/Human Factors V
F. Aghazadeh (Editor)
© Elsevier Science Publishers B.V. (North-Holland), 1988

Attachment 5

COMPREHENSIVE BACK INJURY PREVENTION PROGRAM: AN ERGONOMICS APPROACH FOR CONTROLLING BACK INJURIES IN HEALTH CARE FACILITIES

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An ergonomics approach to comprehensive back injury prevention has been developed to address the perceived shortcomings of current approaches that have exhibited only limited effectiveness. This paper provides an overview of the multi-faceted components of the approach, and reports preliminary results of its effectiveness in controlling back injuries. Retrospective case studies of three health care facilities that have adopted this approach were employed for this pilot investigation.

1. INTRODUCTION

The problem of musculoskeletal overexertion injuries, particularly back injuries, in the health care industry is enormous and widespread. Of all 1987 lost time injury claims* in the health care industry in Ontario, 40.6% were back injuries. The majority of these (90.9%) were strains or sprains resulting from overexertion. Nursing staff suffered 68.6% of these back injuries which appear to be related primarily to the demands of the job rather than personal characteristics of the employees [1,2,3]. Physical demands associated with particular patient handling tasks have been shown to be very high [4,5,6].

Solutions for how to address the problem of back injuries are less clear. The effectiveness of training has been questioned [7,8]. Preplacement selection programs are only aimed at newly hired employees, and are limited by the size of the available worker pool and human rights requirements. Redesigning the job to better match the capabilities of the typical workforce is likely the most effective prevention strategy. However, the alternatives for changing the design of equipment or the workplace are often impractical, prohibitively expensive, or unavailable. Changes to staffing levels are largely out of the control of a publicly funded facility.

An ergonomics approach to comprehensive back injury prevention has been developed, based on the rationale that the predominant underlying factor behind overexertion musculoskeletal injuries is a mismatch between the capabilities of the employees and the demands of the job. There are four essential groups of interacting factors, as illustrated in Figure 1, that must be addressed in order for the program to be effective. These factors are the anthropometric characteristics, capabilities and fitness of the employees, the specific job demands, the training of staff to carry out job demands safely, and management support required to ensure that these three factors are addressed.

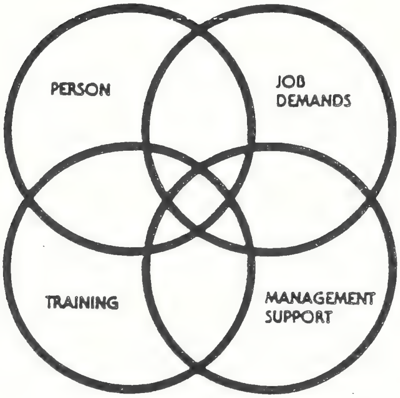

FIGURE 1

Interactive Factors Essential for an Effective Program

Programs aimed at assessing and influencing the capabilities and fitness of the person to meet the demands of the job include pre-placement assessments, back care education, fitness promotion, pausegymnastics and rehabilitation/return to work programs. The effectiveness of such programs in reducing back injuries is dependent on voluntary participation and application of the principles by participants; however, these are factors over which management has little control. If the job demands greatly exceed the capabilities of the workers, such programs will not eliminate the mismatch. Therefore it is essential that the comprehensive injury prevention program include task analysis mechanisms aimed at reducing the demands. Interventions can include changes in procedures, organization of the work, equipment, workplace design, and in staffing levels. Employees also must be trained in the procedures and skills required to utilize the existing resources in the most safe and effective way to carry out their duties. Finally, there must be upper management commitment and support. A study of seven geriatric hospitals evaluating the effectiveness of two program strategies suggested that the management control systems had a greater effect on reducing back injuries than the education program [10]. Policies and procedures must be developed and clearly communicated to all levels of staff, who must be held accountable for fulfilling these responsibilities. If there is lack of compliance, then it is important to identify why the staff are unable to follow policies and procedures, and corrective action must be taken. It may be that the policies or procedures are impractical or the workload pressures may encourage individuals to take shortcuts.

This approach to comprehensive back injury prevention recognizes differences between health care facilities. The programs implemented will vary depending upon the available resources, and the limitations of equipment and workplace design. Facilities must implement the strategies for prevention which will have the greatest impact on improving the match between the employees and the jobs in their institutions.

A pilot project was initiated to assess the effectiveness of this ergonomics approach to back injury prevention.

2. METHODOLOGY

A retrospective case study approach was adopted for the pilot investigation. A hospital, a home for the aged and a hospital linen service that have adopted an approach to managing back injuries corresponding to our ergonomics approach, were selected. Profiles of the program components functioning in the three facilities, and the dates they were initiated, were developed through telephone interviews.

The effectiveness of the programs in reducing back injuries was analyzed using lost time injury claim information contained on the System 57 data base of the Ontario Workers' Compensation Board. Strain and sprain injuries were analyzed by occupational group and part of body. The majority of such injuries result from overexertion situations (95.0% of all strain or sprain back injuries result from overexertion situations provincially), although it is recognized that a small percentage of the injuries may result from other situations such as falls. The results of an analysis not included in this paper confirmed that the majority of strain and sprain injuries suffered in the three facilities were due to overexertion situations.

Injury frequency rates were calculated where paid hours of work were made available from the facilities, to provide an estimate of relative risk of injury and to normalize the data for changes in the size of the worker population. The frequency rates were calculated using the following standard formula.

$$\frac{\text{Number of injuries} \times 200{,}000}{\text{Paid hours of work}} = \text{approximation of the percentage of employees suffering an injury over the year}$$

3. CASE STUDIES

3.1 Nursing Areas in a Hospital

In response to the high number of back injuries, one of Ontario's largest hospitals initiated activities to upgrade its existing back program in 1983. All head nurses participated in a core group leader training program in 1984 to provide them with the expertise to develop appropriate policies and procedures for their departments and to provide job-specific training. Additional lifting devices were also purchased for all units.

The major components of the back injury prevention program were initiated facility-wide in 1985. The pre-placement assessment program included a medical examination and an assessment of lifting skills. The orientation program included an assessment of body mechanics and lifting skills on the job site. An assessment of lifting skills was also carried out with all injured staff returning to work, and education on general back care and lifting techniques was provided monthly. Responsibilities and accountabilities for the programs were established at the supervisory levels. No formal mechanism was established for analyzing the job demands or for problem solving.

In response to the high number of back injuries occurring in orthopaedic wards, which represent four of the 44 nursing wards, a more intensive training and problem-solving program was initiated. This involved primarily on-the-job training and problem solving sessions with small groups co-ordinated by the core group leader. Injury statistics for these wards were provided by the facility for 1985-87 only.

A number of components were added to the program in 1987. A general fitness program was made available to all staff, conducted by a qualified fitness instructor during the lunch hour. A special exercise program was made available to staff who had experienced back problems. A modified work program was initiated to help individuals who had been off work for a long period of time, return to work. Injured employees are now assessed for functional abilities, first by the occupational health physician and then by the trained core person on the job site, before returning. This latter assessment includes a comprehensive assessment of lifting skills. The facility has also drawn on outside resources to assist with task analysis to address job design problems, and is examining the possibility of developing internal resources to carry out these functions.

The lost time injury statistics for the entire facility are presented in Table 1. The number of lost time back injuries for all nursing units, and for the four orthopaedic wards only, are presented in Table 2. Paid hours of work were not available for the nursing areas, prohibiting the calculation of frequency rates.

TABLE 1

Number and frequency of strain or sprain lost time injuries for all occupational groups in a hospital.

	TOTAL		BACKS	
YEAR	NUMBER	FREQUENCY	NUMBER	FREQUENCY
1984	93	3.21	71	2.45
1985	109	3.52	77	2.49
1986	107	3.37	79	2.49
1987	104	3.18	65	1.99
% change 1984-87	+ 11.8	- 0.1	- 8.4	- 18.8

TABLE 2

Number of back injuries for all nursing areas and orthopaedic nursing areas only in a large hospital.

YEAR	ALL NURSING	ORTHOPAEDIC NURSING
1984	48	—
1985	56	21
1986	42	15
1987	39	10
% change		
1984-87	- 18.7	--
1985-87	- 30.4	- 52.4

The results outlined in Table 1 indicate a facility-wide decrease in both the number (-8.4%) and frequency (-18.8%) of back injuries from 1984 to 1987. Over this same time period, the total facility frequency rate for all types of injuries remained relatively constant (-0.1%). This suggests an improvement associated with the facility-wide program initiated in 1985. The higher percentage change in the frequency of back injuries (-18.8%) compared to the number of back injuries (-8.4%) illustrates the value of normalizing the data for changes in staff population. There was an even greater reduction in the number of back injuries in nursing (-18.7%) over the same time period as shown in Table 2. Additional components initiated in nursing included core group leader training for all head nurses and the purchase of mechanical lifting devices. The more intensive program conducted in the orthopaedic wards showed a reduction in back injuries (-52.4%) even greater than that seen across nursing in general (-30.4). This supports the additional value of incorporating program components which address job-specific problem solving. The results also reflect the more concerted and visible support provided by head nurses in these areas. The effectiveness of the programs initiated in 1987 would not be expected to be reflected in this statistical analysis.

3.2 Nursing Areas in a Home for the Aged

The administrator in a medium-sized home for the aged attributed the increasing accident frequency and cost to the high incidence of back injuries. In 1985, extensive back care education was provided to all levels of staff. Additional mechanical lifting devices were purchased and assessment of residents was initiated, which included an assessment of every lifting situation in advance by in-house trainers. Such an assessment considers the characteristics and capabilities of the patient and the care-giver, and environmental factors including the availability and design of equipment. This information was recorded on the patient care plan and communicated through a logo system so that all staff were clearly aware of the procedures. All staff were held accountable on an on-going basis for carrying out correct policies and procedures, and educational sessions were provided on a regular basis.

More detailed individual claims information was available which permitted a specific analysis of overexertion strain and sprain injuries resulting from patient handling situations. The results of the statistical analysis are outlined in Table 3.

TABLE 3

Number and frequency of lost time injuries for
nursing areas in a home for the aged

	TOTAL		BACKS	
YEAR	NUMBER	FREQUENCY	NUMBER	FREQUENCY
1984	3	6.9	3	6.9
1985	6	13.3	4	8.8
1986	4	8.7	0	0
1987	4	8.2	4	8.2
% change 1984-87	+ 33.3	+18.8	33.3	+ 18.8

The results show no back injuries occurred in 1986 following the initiation of the program in 1985. However, there were four back injury claims in 1987. Analysis of the four back injuries by the director of nursing revealed that two back injuries were caused when staff did not follow procedures, even though the logo system identified use of the mechanical lift. The third employee sustaining a back injury was identified as an abuser of the WCB system and had a long history of injuries unrelated to work. No specific contributing factor could be identified for the fourth back injury. The director of nursing in all cases followed up on these injuries and appropriate disciplinary measures were taken where necessary.

These results illustrate the danger of using only a single statistical measure, such as the number of lost time injuries, to assess the effectiveness of a program. A more indepth analysis suggests that when the program is followed, the risks of suffering a back injury have been reduced. It also illustrates the limitation of using lost time injury statistics to evaluate programs in smaller populations where a few injuries can greatly bias the results.

3.3 A Hospital Linen Service

An ergonomic assessment of the workplace design and layout, procedures and physical demands of the tasks was carried out in 1984 in response to senior management's concerns about the high number of back injuries in a hospital linen service. A number of strategies were initiated in 1985 as a result of the assessment to address the identified problems. Several jobs were re-designed. Working levels were adjusted to better match the characteristics of the employees. Jobs that were traditionally rotated on a weekly basis were rotated every two hours. Intensive back education for all employees was initiated. Job specific training and re-orientation after injury were also provided. As it was identified that many of the job demands could not have been designed out, a pausegymnastics program to break the monotonous work routine was established. Twelve employees were trained as pausegymnastics leaders. The program was run twice daily and was used as a warm-up exercise at the beginning of the shift. Occupational health services were contracted in 1986 to provide prompt treatment and early rehabilitation. The results of the statistical analysis are outlined in Table 4.

TABLE 4

Number and frequency of strain or sprain lost time injuries in a hospital linen service.

	TOTAL		BACKS	
YEAR	NUMBER	FREQUENCY	NUMBER	FREQUENCY
1984	26	10.1	10	3.9
1985	26	9.5	16	5.9
1986	20	6.6	11	3.6
1987	16	5.4	5	1.7
% change 1984-87	- 38.5	- 46.5	- 50.0	- 56.4

Since the implementation of the programs in 1985, there has been a 56.4% reduction in the frequency of back injuries and a 46.5% drop in the frequency of strains and sprains in general. These results support the effectiveness of the multi-faceted ergonomics approach. The current pilot investigation was not designed to demonstrate the impact of the rehabilitation and return to work program established in 1986. Such a program would be expected to reduce days lost and recurrence of injuries rather than the total number of injuries.

4. DISCUSSION

The results of the three case studies provide preliminary support for the effectiveness of the multi-faceted ergonomics approach to back injury prevention. The greater reduction in back injuries in the orthopaedic wards compared to nursing in general also suggests that on-the-job instruction and problem solving is an effective strategy for addressing some of the job-specific factors. This observation confirms the conclusions of previous studies [1,2,3] which have pointed to the need to address job-related factors. The large reduction in injuries in the hospital linen service indicates that the principles of the program can be effectively applied to different health care facilities.

Interpretation of these preliminary results is limited. Harber et al. [2] noted that by looking at lost time injuries data only, the prevalence of occupational back pain is greatly underestimated. There is a need for more in-depth analysis to determine the effectiveness of this ergonomics approach. The days lost due to injuries and the recurrence of injuries also need to be examined. The effectiveness of programs targeted at particular subgroups of employees, such as preplacement, orientation and return to work programs, need to be separated from the analysis of the total employee population. It is not possible to separate the relative impact of each component of the programs, though the hypothesis is that a multi-faceted approach will address the shortcomings of any one approach, and therefore be more effective. Finally, lack of objective, qualitative information to evaluate the programs was another limitation of the methodology. Despite these limitations, there would appear to be sufficient support for the effectiveness of this approach to the prevention of back injuries to warrant further investigation.

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* Based upon lost time injury claims for 1987 up to and including September 30, 1987, drawn from the System 57 data base of the Ontario Workers' Compensation Board.

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COST EFFECTIVENESS OF CORE-GROUP TRAINING

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A program for reducing the risk of musculoskeletal injuries due to lifting or transferring patients, involving assessment of risk factors using a training trainers approach for nursing and related personnel has been implemented in many of Ontario's long-term health care facilities. This paper provides an overview of preliminary results of the cost-effectiveness of implementing the program, in relation to the cost of injuries related to patient/resident transfers and lifts. Retrospective case studies of five Ontario nursing homes where the training has been administered were targets of this pilot investigation.

INTRODUCTION

Musculoskeletal injuries (mostly back injuries) related to patient handling among nurses is a serious problem in the health care industry in Ontario. In 1988, 57% of the total 5,395 injuries in the health care industry occurred among nursing personnel, 64%, or 3,466, of these injuries were caused by overexertion. Many training programs have been developed to address this problem. The question of the effectiveness or impact of the programs and their cost benefits has been raised a number of times by researchers and management in health care facilities (R.C. Jensen, 1990; J.D.G. Troup and H.H. Rauhala, 1987). Unfortunately, few studies that focus on evaluating the cost-effectiveness of musculoskeletal injury prevention programs have been documented. It is fairly easy to calculate the cost of the training, but the impact of training and its cost benefit in the workplace are very difficult to project (D.G. Robinson and J. Robinson, 1989).

Instructional training for lifts and transfers is a valuable part of overall prevention strategy, but it is not the only solution to the problem of musculoskeletal injury reduction among nurses. Other factors, such as poor workplace and equipment design and mismatches between the capabilities of the workers and physical demands of the job, are major factors contributing to the cost of Workers' Compensation Board (WCB) claims and to the high injury rate (Aird, et. al. 1988; J.D.G. Troup and H.H. Rauhala, 1987; P. Venning, 1988; Aird, et. al. 1986). Most back injury prevention programs in the health care industry tend to focus on lifting and transferring techniques and general back care procedures for individual workers. Training should be extended to the organizational level, considering all factors together (E. Takala and R. Kukkonen, 1987). How to ensure that the procedures are being followed by the workers, after the instructional training, has not been addressed in the majority of programs. Application of ergonomic principles in a patient lifting and transferring situation, (i.e., taking into consideration all the human and environmental factors), is more likely to have an impact on the success of a training program. (J.D.G. Troup and H.H. Rauhala, 1987; P. Venning, 1988; Aird, et. al. 1986). If any of the factors above are considered independently, the musculoskeletal injury prevention program will not be successful.

A training trainers approach was developed in Ontario to help health care facilities establish resource groups in their own workplaces. The roles and responsibilities of the trainers are to identify risk factors involved in patient handling, and to provide ongoing peer training and problem-solving in preventing musculoskeletal injuries related to patient handling. This paper provides preliminary results of five case studies in Ontario nursing homes where the approach has been adapted. The objective of this study is to measure the direct costs of implementation of the program in relation to the costs of patient handling-related injuries among nursing personnel in these homes.

METHOD

Description of the Approach

Core-groups were established and trained in each of the five facilities by using the training trainers approach. The training was based on the TLC manual (Transfers and Lifts for Care-Givers, HCOHSA, 1986). The manual focuses on the assessment of risk factors in a transfer/lift situation, including risk factors related to the care-giver, client, and environment for the purpose of selecting the safest handling technique for each situation. The program uses a logo and assessment card system to ease documentation of the procedures the care-giver should follow. A number of transfer/lift procedures are illustrated in logos, which are meant to be kept above or close to the patient's bed. This ensures consistency in handling the patient. All procedures are also illustrated in kardex-sized assessment cards, which are meant to be kept in the patient's care plan, to be easily seen by the care-givers. Transfers and lifts are described in detail in the manual so that the care-givers can easily learn them, step by step. The manual also includes basic information on back care and body mechanics, principles of adult education, recommendations for implementation of the program and a sample of the core-group training program.

There were four main steps in the training process:

1. meeting with the chief executive officer and middle management to obtain their commitment to the program,
2. selection of the group to be trained,
3. delivery of the program,
4. a follow-up six months later.

Once senior/middle management had committed itself to the program, staff were informed of the program. Trainees selected by the facility received the TLC manual for reading prior to the actual instructional training. The initial training took approximately two, seven-hour days. The emphasis of the training was on the assessment of risk factors related to any transfer/lift situation to assist in choosing the correct procedure. Training included practical demonstration of assessment, lift/transfer procedures and use of equipment. Ergonomics principles were applied in all aspects of the training; e.g., interface between human and environmental factors.

The principles of adult education were also included since the trainers are expected to carry on the training among their peers. The trainers learned the basics of adult education and ways to communicate the information to their peers. Systematic problem-solving was also a major part of the training program, both in the classroom and on the job site. At the end of the training session, the group, together with the instructor and the chief executive officer, developed an "action plan" for the next four to six months. Resource material on all topics was given to the trainers. During this period, the trainers had an opportunity to develop their skills in topics covered during the instructional sessions. The time spent in these development activities varied in each home, but it was included in the total cost calculation for each. The follow-up session, approximately five hours long, was scheduled six months later to update the activities of the trainers and to solve problems they faced in the interim. In the follow-up session, each group set its goals and objectives for implementing the program.

Population of the Study

In total, forty-eight nursing personnel from the five nursing homes were trained. In one home, their peers selected the core group members, in the remaining four, supervisors and peers selected the core group together. All trainers accepted their responsibility and committed themselves to the program.

Data Collection Method

An eight-month period prior to the training was chosen because the first contact with the facilities occurred approximately eight months before the training began.

a) Questionnaires were sent to all facilities, inquiring about injury status during the eight month period prior to the training and the eight month period after the training was completed and the program implemented. The questions were related to the number of trainees, their paid hours, cost of material, cost of equipment purchased during and following the training, number of staff and their paid hours to replace the trainees, and cost of the environmental or procedural changes resulting from the program.

b) Lost time claims from the Ontario Workers' Compensation Board System 57 data base and the facility's own incident records were documented for the eight month period before the intervention and eight months after.

c) Interviews of the senior and middle managers of the facilities prior, during and after the training, were conducted.

RESULTS

The costs to develop the program were not considered, since the program has been in existence since 1986 and it has been used widely in the health care industry, both in long term and acute care facilities in Ontario. The program instructor's wages were not included in this pilot project either, as the initiative is indirectly funded by the facilities through their assessments paid to the Workers' Compensation Board, so there is no direct cost to the facility. Participants' and the replacements' wages were calculated, including fringe benefits, for the total time spent with the instructor, sessions carried out without the instructor, and for time needed for implementation of the program. Any materials needed for the training were included in the total cost of training. Equipment purchased after the training was not included in the direct cost calculation. The number of staff trained and the costs for each facility are summarized in Table I.

WCB claims were investigated and the costs of injuries related directly to patient transfers and lifts were recorded for approximately eight months before the intervention and eight months after. Table II shows the number of injuries to nursing staff resulting from patient handling, both before and after the training, and associated cost savings. The net cost saving was $57,439.26. Although a number of variables may have contributed to the results, this pilot study suggests that the intensive training of a resource group has some impact on the reduction of number of WCB claims. The severity and number of injuries were down in each case, according to the interviews.

Table I. Cost of Training

Nursing Home	Number of Trainees	Number of Replacements	Total Hours in Training	Cost of Material $	Wages Cost $	Total Cost $
A	12	12	254.5	20.00	4,676.00	4,696.00
B	11	10	255.0	58.50	4,258.73	4,317.23
C	12	7	229.0	180.00	4,960.00	5,140.00
D	8	3	187.5	50.00	2,468.75	2,518.75
E	5	1	80.0	35.00	992.00	1,027.00
Total	48	33	1,006.0	343.50	17,355.48	17,698.98

Table II. Number and Cost of Injuries

Nursing Home	Number of Injuries Before Training	Cost $	Number of Injuries After Training	Cost $	Savings	
					Cost ±$	No.
A	14	12,982.00	3	3,064.00	9,918.00	11
B	9	3,173.63	4	2,875.08	298.55	5
C	8	16,995.00	3	1,446.03	15,548.97	5
D and E	22	39,088.00	4 4	6,400.00 1,014.26	31,673.74	14
Total	53	72,238.63	18	14,799.37	57,439.26	35

Table III compares the costs of implementing the program with the cost savings due to the reduction in injuries. The results show a net cost benefit saving in four of the five facilities. Although no cost benefit occurred in facility B, the number of injuries was down 55% after the program was implemented, with a modest reduction in the cost of injuries. The net cost saving was $43,758.96 for all five facilities.

The cost and number of injuries in nursing homes D and E were combined for the eight months prior to training, since the homes did not document their injuries individually. At the time of training, the homes were separated and given individual firm numbers and more accurate documentation began.

When comparing the difference in the total cost of training in nursing homes D and E and the difference in the costs of injuries over the two, eight-month periods, the results show a total cost benefit of $28,127.99. It does not seem fair to speculate the differences in the numbers and costs of injuries in those homes individually, as it is not known how high they were prior to the training in each home, when only a total is known. Both homes reported very high injury frequency rates over a long period of time prior to the training.

Table III. Cost Benefit of Training

Nursing Home	Cost of Training $	Cost Difference of Injuries After Training $	Savings $
A	4,696.00	9,918.00	5,222.00
B	4,317.23	298.55	(4,018.68)
C	5,140.00	15,548.97	10,408.97
D and E	3,545.75	31,673.74	28,127.99

All five facilities in this study reported a general increase in awareness of risk factors involving lifting and transferring situations among nursing personnel after the training was completed. An interesting point in the intervention was that all five facilities invested more money in a variety of lifting/transferring devices after the implementation of the program and after the core-group assessed the patients and the risk factors involved in transfers and lifts.

According to senior management, the behaviour of staff towards safety in lifting and transferring patients improved when the program was implemented.

DISCUSSION AND CONCLUSION

The results of this study indicate that there is direct cost effectiveness, in the short term, in training a core-group of staff in the facility and it may have an important long term impact in the injury rate and severity of injuries related to patient handling and even more significant long term impact on costs. It is recognized that the training costs in these five cases were not high compared with situations in which the organization has to hire a private consultant to do the training. However, over a longer period, even higher costs would be recovered. Interestingly, each facility undertook a number of initiatives to address the high risk factors involved in lifting and transferring patients. For example, where patients were assessed to be total lifts and the lifting had previously been done manually, the facilities purchased new mechanical lifting devices to reduce the risks; replaced some low beds with high/low beds and old wheelchairs with wheelchairs with detachable arm and leg rests; instituted preventive maintenance of equipment, etc. All these changes in the facilities may have contributed to a decrease in injuries. The costs of such purchases or new programs were not calculated in the study. This indicates that if all indirect cost factors were calculated, the training of the core-group and the number of hours spent in training, expenses to the facility would likely increase.

Predicting costs of possible injuries that did not occur is very difficult, if not impossible. However, pre- and post-training periods in this study indicate that intensive training of a resource group has a valuable impact in injury rates. Only one home in the study shows a negative number of dollars in direct cost of training and the cost of injuries over the eight-months before and eight months after the intervention. The content and method of training was the same in each home. The only difference was in home A where co-workers selected the core-group, as opposed to joint co-worker/management selection of trainees. The level of commitment to the program in senior/middle management was high in all facilities. Research indicates that training without a management control system does not have great impact on the cost and number of injuries in the workplace (D. Wood, 1987; Aird et. al., 1988). The data collected was limited by the fact that there was no access to investigate each injury before and after the training, to get accurate information about the source and cause of injury. In addition, the twenty-two month period of the intervention, is too short to get accurate documentation of real cost benefits, if any, or to show the real impact of training. More time should be allocated to the investigation of the cost-effectiveness of any given training.

This pilot investigation supports the view that training individual employees on body mechanics and lifts and transfers, as many back care programs suggest, is not good enough. Instead, establishing and training a resource group to facilitate ongoing training, to identify risk factors involved, and also to apply ergonomic principles towards prevention of musculoskeletal injuries must be taken into consideration in training nursing personnel (P. Harber et. al. 1985; Troup et. al 1987).

Although positive observations were made about the cost benefit of training a resource group, the study suggests that to get an accurate calculation of the cost benefit of training a resource group in relation to patient lifting/transferring-related injuries, more detailed documentation of the sources and causes of injuries is required.

In addition, this study shows to fully identify cost benefits, further investigation of all the indirect costs resulting from the initial training is necessary.

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BACK INJURY WORKSHOP: OCTOBER 16/17 - 1991

SETTING UP A BACK INJURY PREVENTION PROGRAM

1. IMPLEMENTING A BACK INJURY PREVENTION PROGRAM - GOALS THAT ARE ACHIEVABLE IN THE NEXT SIX MONTHS

1. COOPERATION AND FORMAL SUPPORT FROM:
    - A). CEO (POLICY)
    - B). MANAGEMENT AND STAFF
2. INCREASED AWARENESS THAT BACK INJURIES ARE PREVENTABLE.
3. IDENTIFY TARGET GROUP FOR PROGRAM.
4. HAVE A BACKCARE PROGRAM IN PLACE (for on job and off).
5. PILOT A FITNESS PROGRAM IN A HIGH INJURY AREA.
6. CASE MANAGEMENT OF LOST TIME CLAIMS.
7. CHANGE MENTAL MODE OF EMPLOYEES SO THAT THERE IS A DESIRE TO RETURN TO WORK EARLY AFTER AN INJURY.
8. EDUCATION ONGOING - TO SPECIFIC HIGH RISK AREAS.
9. EVALUATION OF PROGRAM ONGOING - DEVELOP EVALUATION TOOLS TO MONITOR PROGRESS.

2. IMPLEMENTING A BACK INJURY PREVENTION PROGRAM - ACTIVITIES TO ACHIEVE GOALS

1. COLLECTION OF STATISTICAL INFORMATION:
    - A. WHO IS AFFECTED?
    - B. WHERE?
    - C. ACTIVITIES THAT CAUSED INJURY.
    - D. SEVERITY - WHAT PART OF BACK INJURED.
    - E. FREQUENCY.
2. INVENTORY OF WHAT COMPONENTS OF A BACK INJURY PREVENTION PROGRAM ARE ALREADY IN PLACE. EVALUATE IT ON ITS SUCCESS.
3. IDENTIFY RESOURCES NEEDED AND APPOINT A COORDINATOR.
4. MARKET THE PROGRAM USING THE STATISTICS TO DEMONSTRATE THE COST TO EMPLOYER IN TERMS OF DOLLARS AND HUMAN SUFFERING.
5. OBTAIN ADMINISTRATION AND LABOUR APPROVAL.

6. WORK WITH CEO AND DEPARTMENT HEADS TO SELL PROGRAM.

7. PROVIDE FITNESS INCENTIVES:
    A. DISCOUNTS AT FITNESS CENTRES
    B. AVAILABILITY OF FITNESS ASSESSMENTS

8. SET UP POLICY/PROCEDURES FOR CASE MANAGEMENT.

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